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April 19, 2012

Mr. Ray Basso
Ms. Stephanie Vaughn
Emergency and Remedial Response Division
U.S. EPA, Region 2
290 Broadway, 19th Floor
New York, New York 10007

Via Electronic Mail

Re: ***River Mile 10.9 Characterization Program Summary, Lower Passaic River Study (LPRSA) - Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigation/Feasibility Studies (RI/FS)***
CERCLA Docket No. 02-2007-2009

Dear Mr. Basso and Ms. Vaughn:

On behalf of the Cooperating Parties Group (CPG), ***de maximis, inc.*** submits herewith the results of the River Mile 10.9 Characterization Program of the LPRSA RI/FS which the CPG agreed to undertake on April 15, 2011. Subsequently, the CPG submitted a series of QAPP Addenda. The enclosed River Mile 10.9 Characterization Program Summary (RM 10.9 Report) is comprised of the following materials:

1. RM 10.9 Report Text and Tables – (Word and PDF files will be posted to the LPR SharePoint)
2. RM 10.9 Report figures –(PDF file will be posted to the LPR SharePoint)
3. RM 10.9 Report Appendices (will be forwarded to EPA and CDM for posting to the LPR SharePoint):
    a. Appendix A Data Quality Objectives
    b. Appendix B Field Documentation
    c. Appendix C Ambient Air Monitoring Data
    d. Appendix D Tide Gage Data
    e. Appendix E Sample Summary Tables
    f. Appendix F Investigation Derived Waste Supporting Documentation
    g. Appendix G Lithology Core Records
    h. Appendix H Photo-Documentation
    i. Appendix I Sedimentology Report (to be forwarded under separate cover)
    j. Appendix J Laboratory Electronic Data Deliverables and Data Reports
    k. Appendix K Quality Control Results Summary
    l. Appendix L Performance Evaluation Samples
    m. Appendix M Data Validation Reports
    n. Appendix N Data Results Summary

o. Appendix O Bathymetry Survey
p. Appendix P Hydrodynamic Field Investigation
q. Appendix Q Field Modification Forms and Nonconformance Reports

As directed by Region 2, this data summary and characterization report (and all such reports) does not include any evaluation or interpretation of the subject data. However, such evaluation has been conducted to support development of the RM 10.9 Removal Action Scope of Work and continued development of the overall Conceptual Site Model.

The evaluation has demonstrated that the nature of the RM 10.9 deposit and the spatial distribution of COPCs in it are explainable by local hydrodynamics, physical characteristics of the sediments, channel morphology and dredging and depositional history. Moreover, the findings at RM 10.9 may be consistent with the physics identified by Sea Engineering and Hydroqual in the May 2011 System Understanding of Sediment Transport.

- **Local Hydrodynamics –** Most of the deposit experiences low shear stress[1] even during significant high flow events. Stresses high enough to erode sediments occasionally occur within the channel along the northern and central outer extent of the deposit.

- **Physical Characteristics of the Sediments –** The sediments in the lower energy environment that encompasses most of the deposit tend to be muddy with a high fraction of fine sediments. Coarse sediments (e.g. sand) exist in the higher energy environment along the boundary of the navigation channel.[2]

- **Channel Morphology -** The deposit is located on the inside of a bend and is a point bar formed by sediment deposition due to the classical velocity pattern around a bend in which velocity drops off toward the inside of the bend.[3]

- **Dredging and Depositional History -** The authorized navigation channel extends through the outer region of the sediment deposit, and was last dredged to the 10-foot authorized depth in 1932. The spatial distribution of apparent sedimentation

[1] Results from the calibrated High-Resolution RM 10.9 Hydrodynamic Model
[2] "The particle sizes correlate strongly to morphologic regions in the river. The highest fine content is located on lower energy inner bends of the river identified as broad shoals in the morphology maps. The higher velocity channel regions and deeper scoured channels generally have higher sand content." Lower Passaic River System Understanding of Sediment Transport, HQI and Sea Engineering May 2011
[3] "The point bar deposition/ mudflat regions on the inside bends, where the current velocity is lower, fall in line with what one expects in typical curving channel flow. This behavior can be observed nearly uniformly throughout the river with corresponding deep channels on the outer bends where the current velocity is higher." Lower Passaic River System Understanding of Sediment Transport, HQI and Sea Engineering May 2011

rates and the vertical distribution of COPCs are clearly influenced by historic dredging activity.

The vertical and horizontal COPC patterns in the RM 10.9 sediments appear to be reflective of the characteristics of the sediment and historic sedimentation rates (i.e. from radiochemical dating). In general, the higher concentrations were found in the finer sediments. Peak concentrations are located at depths below the sediment surface and appear to reflect historic rates of sedimentation. Sedimentation has been low outside of the historically dredged area and relatively old sediments exist at or near the surface of the bed. Near shore areas that were last dredged in 1932 (which appear to include areas 50 to 100 feet shoreward of the current navigation channel boundary), appear to have experienced high sedimentation in the early years following dredging and much less sedimentation in more recent times. It appears that the region of particularly high surficial sediment COPC concentrations in the near shore portion of the deposit is no longer depositional and is in a state of dynamic equilibrium with accretion possibly limited to the rate of sea level rise.

Within the boundary of the navigation channel, where water depths and flow velocities are greater, the surficial sediment COPC concentrations are similar to or lower than river-wide average surficial concentrations. The peak sediment COPC concentrations occur at depth. The vertical distribution of COPCs and radiochemical concentrations exhibit a less organized pattern than observed in other areas of the deposit.

The thickest portion of the deposit is at its southern end where peak sediment COPC concentrations are typically 4 to 8 ft below the sediment surface. The vertical profiles of sediment COPC concentrations exhibit broad peaks, where relatively uniform concentrations extend vertically over several feet. Similar to the outer extent of the sediment deposit, surficial COPC sediment concentrations in the southern portion of the deposit are comparable to river-wide average surficial concentrations.

Several single and multi-bathymetry surveys have been performed within the RM 10.9 study area, and comparison of these data sets (including the October 2011 post-Irene bathymetric survey) indicates a generally stable bed. Most of the deposit that could be surveyed (n.b., the surveys did not extend into the near shore shallows) exhibited no detectable change in bed elevation over the several year period covered by the surveys. Some erosion (on the order of 1 to 1.5 feet) occurred along a narrow band (less than 25 feet in width) within the channel and primarily at the northern extent of the sediment deposit between surveys bounding significant high flow events. These findings from the bathymetric data are consistent with observations from the sediment COPC and radiochemical data and corroborate the interpretation of those patterns.

The multiple data sets (bathymetry, hydrodynamic data, sediment data, and radiochemical data) collected as part of the RM 10.9 Characterization Program demonstrate significant structure and order to the COPC patterns in the deposit that are explainable by the physical environment and historical deposition. This structure reinforces the insights and understanding regarding the river as a whole that have been gained by the various data sets gathered as part of the remedial investigation.

The CPG would welcome the opportunity to participate with EPA in a series of technical exchanges regarding the understanding of the river obtained from the RM 10.9 data and the ability to use that understanding to better interpret the river-wide patterns of sediment contamination. We propose that these exchanges center on the following topics:

- RM 10.9 Sediment COPC patterns
- RM 10.9 High-resolution hydrodynamic model results
- Bathymetric depth-difference evaluations
- Integration of multiple lines of evidence to interpret RM 10.9 data
- Comparison of RM 10.9 evaluations with other areas above RM 8 (LRC, Benthic Grabs and SSP data)
- Comparison of RM 10.9 and other areas above RM 8 with river-wide observations

These exchanges would allow the EPA and the CPG to discuss approaches for identifying areas in the river where active remediation could be effective in reducing risk and accelerating recovery.

The CPG looks forward to discussing the results of the RM 10.9 characterization and the other LPR data collected to support the development of a remedial solution for the entire LPRSA.

Please contact Bill Potter or me with any questions or comments.

Very truly yours,

de maximis, inc.

Robert Law, PhD
CPG Project Coordinator

cc: CPG Coordinating Counsel
CPG Members